

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-175311

(43)Date of publication of application : 21.06.2002

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(51)Int.Cl. G06F 17/30  
G06F 12/00  
H04N 5/76  
H04N 5/91  
H04N 7/173

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(54) METHOD AND DEVICE FOR REGISTERING VIDEO INFORMATION, AND  
METHOD AND DEVICE FOR RETRIEVING THE VIDEO INFORMATION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide technology capable of registering video information for realizing high retrieving accuracy in a video database.

SOLUTION: A video featured value is extracted from an image to be registered, the extracted video featured value is embedded in the image to be registered as a format, corresponding to the identification(ID) information of an extraction algorithm and the image in which the video featured value is padded is registered in the video data base by a format corresponding to the video featured value. The video featured value, embedded in a reading image, is detected, an image, in which a video featured value similar to the detected video featured value is embedded, is retrieved from the video data base and outputted. Thus high retrieval accuracy can be realized in accordance with the constitution, by solving the problem of conventional technology which adopts constitution for outputting the video featured value and the image by a communication data format linking both the featured value and the image.

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LEGAL STATUS [Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] The image information registration approach characterized by having the process in which image characteristic quantity is extracted from the image for registration, the process which embeds the above-mentioned image characteristic quantity on the image for registration using digital watermarking, and the process in which the image where the above-mentioned image characteristic quantity was embedded is registered into the image contents are recording section, taking a response with the embedded image characteristic quantity.

[Claim 2] The 1st process in which image characteristic quantity is extracted from the image for registration using two or more extract algorithms, Taking a response with the identification information of an extract algorithm which used the above-mentioned image characteristic quantity for the extract of that The image information registration approach characterized by having the 2nd process embedded on the image for registration using digital watermarking, and the 3rd process in which the image where the above-mentioned image characteristic quantity was embedded is registered into the image contents are recording section, taking a response with the embedded image characteristic quantity.

[Claim 3] The image information registration approach characterized by processing so that what arranged systematically the image characteristic quantity extracted from each frame may be extracted as final image characteristic quantity in the image information registration approach indicated by claim 2 when an image is constituted from the 1st process of the above by the multiple frame.

[Claim 4] The image information registration approach characterized by processing in the image information registration approach indicated by claim 2 or 3 so that it may embed on the image for registration also about the management information of the image for registration in the 2nd process of the above using digital watermarking.

[Claim 5] The image information registration approach characterized by processing so that two or more algorithms of digital-watermarking embedding may be prepared, the optimal thing may be chosen out of it and the above-mentioned image characteristic quantity may be embedded on the image for registration in the 2nd process of the above using it in the image information registration approach indicated by claim 2 thru/or any 1 term of 4.

[Claim 6] A means to extract image characteristic quantity from the image for registration using two or more extract algorithms, Taking a response with the identification information of an extract algorithm which used the above-mentioned image characteristic quantity for the extract of that Image information registration equipment characterized by having the means embedded on the image for registration using digital watermarking, and a means to register into the image contents are recording section the image where the above-mentioned image characteristic quantity was embedded, taking a response with the embedded image characteristic quantity.

[Claim 7] The process in which the access image where image characteristic quantity was embedded using digital watermarking is inputted, By accessing the image contents are recording section which memorizes the process in which the image characteristic quantity currently embedded at it is detected from the access image which carried out [ above-mentioned ] the input, and the image where image characteristic quantity was embedded, taking a response with the embedded image characteristic quantity The process in which a thing similar to the image characteristic quantity which carried out [ above-mentioned ] detection out of the image characteristic quantity memorized by this image contents are recording section is searched, The image information retrieval approach characterized by having the process which reads and outputs the image where the image characteristic quantity matched with the image characteristic quantity which carried out [ above-mentioned ] retrieval was embedded from the above-mentioned image contents are recording section.

[Claim 8] A means to input the access image where image characteristic quantity was embedded using digital watermarking, By accessing the image contents are recording section which memorizes a means to detect the image characteristic quantity currently embedded at it from the access image which carried out [ above-mentioned ] the input, and the image where image characteristic quantity was embedded, taking a response with the embedded image characteristic quantity A means to search a thing similar to the image characteristic quantity which carried out [ above-mentioned ] detection out of the image characteristic quantity memorized by this image contents are recording section, Image information retrieval equipment characterized by having a means to read and output the image where the image characteristic quantity matched with the image characteristic quantity which carried out [ above-mentioned ] retrieval was embedded from the above-mentioned image contents are recording section.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image information registration approach and equipment which enable it to register into an image database the image information which realizes high retrieval precision, and the image information retrieval approach and equipment with which it enables it to retrieve the image information registered by the image information registration approach and equipment.

[0002]

[Description of the Prior Art] The conventional image retrieval is explained according to the Internet image retrieval shown in drawing 7 .

[0003] An end user side is equipped with the means for searching image media using a terminal unit, and he is trying to acquire the target contents (image), as shown in this drawing, looking at the access information displayed on a homepage (H.P.) as the database by the side of a network using the communication procedure by TCP/IP.

[0004] (1) in the configuration / actuation HP section of the HP section by the side of a network While having the communication interface which consists of a reception function to receive the retrieval information from an end user side, and a transmitting function for carrying out down loading of the searched image or the perused image It has the image function manager which performs retrieval information management of the contents transmitted between the image access function for operating the database formed in the form linked to the communication interface, and the communication interface and the database which accumulates an image.

[0005] The still picture which is a part of image perused is accumulated in this image access function, and an image function manager performs management with the database access information linked to the access image by which user assignment is carried out, and an access image based on the URL information inputted from a communication interface.

[0006] (2) Configuration / actuation one side of a database and a database are equipped with the image contents are recording function which accumulates contents (image), and the image function manager which performs retrieval and are recording management of an image contents are recording function.

[0007] The retrieval ID information (in this invention, the information which shows the description of contents is called retrieval ID information) in this image management information, and the contents which an image contents are recording function accumulates link, and based on the access information from the image function manager of the HP section, the image function manager of a database performs the selection output of contents, and they have the composition of downloading contents to an end user.

[0008] As stated above, since the image function manager is intervened and matched, the retrieval information which is ID information on contents and contents needs to communicate in the communication link data format to which retrieval ID information and contents were made to link, when sending contents between the HP section and a database.

[0009] He makes retrieval ID information and contents link, and is trying to specifically communicate with the conventional technique using the data format which holds retrieval ID information in a part for a header unit.

[0010]

[Problem(s) to be Solved by the Invention] However, if the approach of communicating

like the conventional technique in the communication link data format to which retrieval ID information and contents were made linking is used, in case it will carry out format conversion of the contents sent from the database for construction of an access environment etc. or image edit processing etc. will be performed, there is a trouble that the retrieval ID information recorded on a part for the header unit of communication link data format may be destroyed.

[0011] There is a trouble that it happens that the image which the selected access image will point out from now on cannot be searched.

[0012] Furthermore, when the approach of communicating like the conventional technique in the communication link data format to which retrieval ID information and contents were made linking is used, there is a trouble that the cost and the effort for employment maintenance of the administrative information will become huge.

[0013] This invention is made in view of this situation, and aims at offer of the new image information registration approach and the equipment which enable it to register into an image database the image information which realizes high retrieval precision, and offer of the new image information-retrieval approach and the equipment with which it enables it to retrieve the image information registered by the image information registration approach and equipment.

[0014]

[Means for Solving the Problem] In order to attain this object, the image information registration approach of this invention The process in which image characteristic quantity is extracted from the image for registration using two or more extract algorithms, Taking a response with the identification information of an extract algorithm which used the extracted image characteristic quantity for the extract of that It constitutes so that it may have the process embedded on the image for registration using digital watermarking, and the process in which the image where image characteristic quantity was embedded is registered into the image contents are recording section, taking a response with the embedded image characteristic quantity.

[0015] In order to attain this object, and the image information retrieval approach of this invention By the process in which the access image where image characteristic quantity was embedded using digital watermarking is inputted, the process in which the image characteristic quantity currently embedded from the inputted access image at it is detected, and accessing the above-mentioned image contents are recording section The process in which a thing similar to the detected image characteristic quantity out of the image characteristic quantity memorized by the image contents are recording section is searched, It constitutes from the image contents are recording section so that it may have the process which reads and outputs the image where the image characteristic quantity matched with the searched image characteristic quantity was embedded.

[0016] According to the image information registration approach of this invention,

according to this configuration, the image by which image characteristic quantity was embedded in the form where the identification information of an extract algorithm and a response are taken, on the image for registration, and that image characteristic quantity was embedded on it will be registered into the image contents are recording section in the form where a response with image characteristic quantity is taken.

[0017] And according to this configuration, according to the image information retrieval approach of this invention, the image where image characteristic quantity with image characteristic quantity similar to the image characteristic quantity detected from the access image was embedded will be searched, and it will be outputted from this image contents are recording section.

[0018] Thus, since the image where image characteristic quantity was embedded will be searched and outputted from an image database while the image where image characteristic quantity was embedded is registered into an image database according to this invention, the trouble which the conventional technique which takes the configuration of outputting in the communication link data format to which image characteristic quantity and an image were made linking has can be solved.

[0019]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail according to the gestalt of operation.

[0020] The example of 1 operation gestalt of the whole configuration of the image retrieval system which possesses this invention in drawing 1 is illustrated.

[0021] As shown in this drawing, the image retrieval system possessing this invention consists of a retrieval system 1 located in a network side, and a terminal unit 2 located in an end user side.

[0022] This retrieval system 1 is equipped with the HP (homepage) section 10 and a database 11, and, on the other hand, a terminal unit 2 is equipped with HP access section 20 and the down loading corresponding point 21.

[0023] Next, the detail of these each part is explained.

[0024] (1) The configuration HP section 10 of the (Configuration a) HP section 10 of a retrieval system 1 offers a homepage as an interface by the side of the end user using a database 11.

[0025] This HP section 10 is equipped with GUI (graphic user interface)100 for operating a database 11, the access image are recording section 101 which accumulates the access image used as the object for retrieval, the receive section 102 which receives the retrieval information sent from a user side, and the image transmitting section 103 for carrying out down loading of the image and access image which were searched from the database 11.

[0026] The access image in which down loading is carried out by the image transmitting section 103 consists of a part (still picture), i.e., the frame image, or a short continuation frame of an animation etc., and the attribute which is the

description of the image used as the object for retrieval is embedded by digital watermarking on these access images. In addition, some not only animations but static images, such as poster gravure exhibited on the occasion of film disclosure, etc. are contained in an access image.

[0027] (b) The media retrieval equipped with the digital-watermarking processing facility which is the description of this invention is applied to the configuration database 11 of a database 11. In this example of an operation gestalt, the database 11 is installed in the retrieval system 1 by the side of a network.

[0028] This database 11 is equipped with the image contents are recording section 110, the input interface section 111, the output interface section 112, and the utility section 113.

[0029] (b) The image set as the object of retrieval is accumulated in the image contents are recording section 110. The retrieval ID information (information which shows the description of the image extracted from the image of an original copy) specifically stored in the form linked to the image of an original copy and the image of an original copy, and ID embedding image created by retrieval ID information being embedded by digital watermarking into the image of an original copy are accumulated.

[0030] Here, it stores about the image of an original copy besides ID embedding image because it may be unable to take out only the image of an original copy from ID embedding image depending on the algorithm of digital watermarking. Moreover, by having taken out retrieval ID information from ID embedding image one by one, it stores about retrieval ID information besides ID embedding image because the retrieval engine performance falls.

[0031] (b) The input interface section 111 is an interface for inputting an access image into a database 11. This input interface section 111 is equipped with the digital-watermarking detection function for generating the retrieval ID information which shows the description of an image by detecting the digital-watermarking information embedded on the access image which is the non-language retrieval information source.

[0032] (c) The output interface section 112 is an interface for outputting the image information retrieved based on retrieval ID information from a database 11.

[0033] (d) The utility section 113 performs data control of a database 11, and control of data I/O. This utility section 113 is equipped with the digital-watermarking embedding function, digital-watermarking detection function, and image feature-extraction function which are needed in case the maintenance of the addition and renewal of the new image information on the image contents are recording section 110, and are recording information is performed.

[0034] (2) The configuration end user side of a terminal unit 2 searches image media using a terminal unit 2.

[0035] This terminal unit 2 is equipped with HP access section 20 which processes



selection of an access image, acquisition of an image attribute, etc. which are displayed on a homepage using TCP/IP, and the downloading corresponding point 21 which receives the retrieved image information which is sent through a network.

[0036] Next, the detailed configuration of a database 11 is explained.

[0037] To drawing 2, the example of 1 operation gestalt of the detailed configuration of a database 11 is illustrated. The same notation has shown among drawing what was explained by drawing 1, and 114 is the retrieval section which performs processing which retrieves the image information accumulated in the image contents are recording section 110.

[0038] The image contents are recording section 110 is accumulating the retrieval ID information stored for the reason mentioned above in the form linked to the image of an original copy, and the image of an original copy, and ID embedding image created by retrieval ID information being embedded by digital watermarking into the image of an original copy.

[0039] Here, the link is stretched between ID embedding image and the image of an original copy which became the creation origin, therefore the link is stretched between ID embedding image and the retrieval ID information currently embedded at it.

[0040] In the creation phase of contents, or the retrieval process of contents, since that of the direction changed into the condition of having extracted the retrieval ID information other than the reason mentioned above from ID embedding image is efficient, the configuration of linking and accumulating retrieval ID information in ID embedding image is taken.

[0041] As a content of the retrieval ID information that it uses for retrieval of the image information accumulated in the image contents are recording section 110, there are the following attributes, for example and any attribute is effectively used from the improvement in retrieval precision, and a viewpoint of compaction of a retrieval rate to retrieval.

[0042] There are various things, such as information (when the characteristic scene scene is included [ else ], it is the description of the scene), such as patterns of frame change, such as a pattern showing the physical description (property) of an image of change of the scene change as information and a pattern of an optical flow, and a scene.

[0043] The direction which used what system-arranged, typified the extracted raw data and was transposed to code information etc. is advantageous to the pattern information given as retrieval ID information in the viewpoint of economization of retrieval ID amount of information. So, in this invention, the configuration of using retrieval ID information with the quantitative value transposed to code information etc. is taken.

[0044] The image scene shown in drawing 3 is made into an example, and an example of retrieval ID information used by this invention is explained.

[0045] In this drawing 3 , each of frame #k, #k+1, and #k+2 is divided into the block for extracting the image description, and it comes to illustrate matching in case inter-frame compares. Although one frame is divided into 8 blocks in drawing 3 , it cannot be overemphasized that you may divide into much blocks further actually.

[0046] The image scene shown in drawing 3 consists of a street tree scenery scene and a seashore scenery scene, and a street tree scenery scene consists of a background and an animal object without a motion (or a motion is small). On the other hand, a seashore scenery scene is a night view, the video-signal value which consists of YUV is smaller than a street tree scenery scene, and a motion makes it small.

[0047] In an image with such two scenes, the example arranged as information showing the physical description (property) of an image is shown in drawing 4 .

[0048] as the algorithm which extracts the description of an image here -- inter-frame -- difference -- Y, U, and V of a value, a motion vector, an OPUDI cull flow, and a pixel What extracts the signal average is assumed. The numeric value in a parenthesis shows the number of the blocks with a large change in one frame, and can grasp the magnitude of an animal object from this block count. moreover, inter-frame [ to frame #k ] -- the object for a comparison of difference is frame #k-1 which is not illustrated, and frame #k-1 assumes that a background is the same as #k except for an animal object.

[0049] In addition, an optical flow is an extract algorithm which performs processing which performs Hough conversion to a motion vector, and has the function to specify the direction and include angle of the motion which changes continuously.

[0050] the part of the scene change which changed from the street tree scenery scene to the seashore scenery scene -- inter-frame -- difference -- a value is judged about a whole block and it can specify by counting the large block count of change. About a motion vector, in a scene change, it may not exist in frame #k+1 which the pixel signal level in frame #k compares, and detecting becomes impossible at this time. Moreover, an OPUDI cull flow will also break off. An average pixel value serves as a decision criterion of a scene change with regards to the brightness of the whole scene, and color.

[0051] Although each of these image description algorithms is easily [ it is well-known and ] realizable, the image description from various viewpoints can be quantified by combining much these.

[0052] Moreover, although the image description shown in drawing 4 is processing in image space, the description in frequency space may be added further. For example, the Fourier transform is carried out for every frame, and it asks for spatial frequency  $\omega$  and the relation of a power spectrum  $S(\omega)$ . It sets to this related  $S(\omega) \propto \omega^{-D}$ , and is  $S(\omega)$ . It is known that the forward constant D (fractal dimension) which specifies extent of reduction will contribute to image scenes (for example, extent of the steepness of a mountain range etc.), and this constant D

may be applied to retrieval ID information. [0053] In this invention, although the image description will be embedded as digital watermarking, you may also embed not the description but the thing arranged and typified systematically for every frame as retrieval ID information in this case. for example, inter-frame [ for all the frames of an image ] -- difference -- the statistic of the image descriptions, such as a value or the change width of face of a motion vector and an average value, the number of scene changes, and a fractal dimension, -- further -- inter-frame [ for every scene of an image ] -- difference -- you may also embed a value or the change width of face of a motion vector, a fractal dimension, etc. as retrieval ID information.

[0054] Thus, when using two or more things as an algorithm which extracts the description of an image, although an image feature-extraction result serves as a set of many image descriptions, complicated means, such as image recognition, can be realized that it is not required and easily. If it is a case with the going too far pattern of a physical characteristic, the quantified value will serve as an important decision ingredient distinguished from other images.

[0055] By increasing a valuation basis, retrieval precision of the description of the approach using such picture characteristics improves certainly. Although it is difficult to describe image discernment thoroughly by the content convention by the language based on the sensation of human beings, such as a keyword, the approach using such picture characteristics is effective for the problem solving.

[0056] It is important to give a keyword, comment information, etc. as a thing concerning the content of an image, of course, and it can use as retrieval ID information also about the information which is not such a content of an image itself. Moreover, for example, it can use as retrieval ID information if needed also about information unrelated to the contents of an image, such as manufacture of an image, capacity, and a negotiation.

[0057] By adding the management information (information on a keyword, a comment, or others) which is not directly related to such a content of an image to retrieval ID information, improvement in retrieval precision can be further aimed at now.

[0058] The database 11 is equipped with the input interface section 111, the retrieval section 114, the output interface section 112, and the utility section 113 other than the image contents are recording section 110 if it returns to explanation of drawing 2 .

[0059] When an access image is chosen, this input interface section 111 Processing which detects the retrieval ID information currently embedded on the access image using the digital-watermarking detecting element 1110 is performed. The retrieval section 114 Performing processing which searches a thing similar to this retrieved retrieval ID information out of the retrieval ID information accumulated in the image contents are recording section 110, the output interface section 112 performs processing which outputs the retrieved retrieval ID information and ID embedding image to link.

[0060] The digital-watermarking detecting element 1110 of the input interface section 111 is equipped with two or more watermark detection functions in which methods differ. There are various things with the fitness which embedded at the algorithm of the embedding of digital watermarking and suited the object, and it has the watermark detection method 1 with which algorithms differ – M in order to correspond to them.

[0061] This digital-watermarking detecting element 1110 detects a watermark by changing to other algorithms, when a watermark is not able to be detected with a certain algorithm to the inputted access image (the amount of detection of a watermark can estimate). In addition, even if selection of an algorithm is appropriate, it spaces, also when the parameter setup of detection conditions is not suitable, and detection is impossible. Then, with algorithm selection, parameter selection is controlled and a watermark is detected.

[0062] Thus, the digital-watermarking information detected from the access image is inputted into the retrieval section 114 through the I/O section as retrieval ID information, and if ID embedding image which corresponds by the retrieval section 114 is found, the ID embedding image will be outputted through the output interface section 112.

[0063] In addition, the change of the detection algorithm in the digital-watermarking detecting element 1110, setting out of a detection parameter, and the I/O hardware control between the image contents are recording sections 110 will be controlled by the database control section 1135 of the you TERITI section 113 mentioned later.

[0064] Next, the detailed configuration of the utility section 113 is explained.

[0065] The utility section 113 performs data control of a database 11, and control of data I/O, as mentioned above. As a still more important function, although it has the addition and the function to update of new image information to the image contents are recording section 110, at this time, the description of an image is extracted and processing which embeds it on an image using digital watermarking is performed. And the retrieval ID information (the image description information) currently embedded on the ID embedding image is detected by making into a processing object ID embedding image accumulated in the image contents are recording section 110, and processing which carries out the monitor output of it is performed.

[0066] In order to perform these processings, the utility section 113 is equipped with the image feature-extraction section 1130, the digital-watermarking embedding section 1131, the I/O section 1132, the digital-watermarking detecting element 1133, the monitor output section 1134, and the database control section 1135 as shown in drawing 2.

[0067] (1) The image feature-extraction section 1130 image feature-extraction section 1130 performs processing which extracts the description of the image embedded as digital watermarking, and is equipped with two or more (1 – N) sampling procedures with which algorithms differ. For example, the inter-frame comparison of

an image was performed and it has the function to specify the rate of a part with a scene change or a motion, the function to extract the line drawing texture using the Hough conversion, etc. Two or more sets of these algorithms are doubled, and the image feature extraction from various assessment views is performed.

[0068] (2) The digital-watermarking embedding section 1131 digital-watermarking embedding section 1131 performs the processing which makes as reception the image description which the image feature-extraction section 1130 outputs, and is embedded on an image by making it into digital watermarking, it is equipped with two or more (1-M) watermark embedding methods with which algorithms differ, chooses one algorithm which embedded out of it and was suitable for the image of the target image characteristic quantity or the embedding point, and performs embedding processing using it.

[0069] It processes so that it may embed in the embedding of this image description (retrieval ID information) also about the discernment ID of the extract algorithm used for the extract of that image description (identification information expressed by a number etc.).

[0070] (3) Operate as an interface between the I/O section 1132 utility section 113 and the image contents are recording section 110.

[0071] (4) When the digital-watermarking detecting-element 1133 digital-watermarking detecting element 1133 performs processing which incorporates ID embedding image accumulated in the image contents are-recording section 110, and detects the retrieval ID information (the image description information) currently embedded, is equipped with two or more (1-M) watermark detection methods with which algorithms differ and a watermark is not able to be detected with a certain algorithm, detect a watermark by changing to other algorithms.

[0072] Thus, the detected retrieval ID information is fed back to the image contents are recording section 110 if needed, and the buffer of it will be carried out with the image where retrieval ID information is not embedded, the image where retrieval ID information was embedded, and the gestalt to link, or it will be outputted to the monitor output section 1134.

[0073] (5) It is the interface prepared in order to carry out the monitor of the image and retrieval ID information which are accumulated in the monitor output section 1134 image contents are recording section 110. Moreover, monitoring of the retrieval ID information detected by the digital-watermarking detecting element 1133 and ID embedding image which became that detection origin is also performed through this interface. The monitor output section 1134 is equipped with the processing for it, and video format \*\*\*\*\* for converting retrieval ID information into a video signal.

[0074] (6) The database control-section 1135 database control section 1135 performs processing which controls the image feature-extraction section 1130, the digital-watermarking embedding section 1131, the I/O section 1132, the

digital-watermarking detecting element 1133, and the monitor output section 1134.

[0075] The control signal which the database control section 1135 publishes to drawing 5 is illustrated. The content of control over each functional module of this control signal is as follows.

[0076] (a) Selection of a control signal Cont.1 digital-watermarking embedding algorithm, and setting out of embedding parameters (digital-watermarking key information, watermark embedding reinforcement, etc.).

[0077] (b) Selection of a control signal Cont.2 digital-watermarking detection algorithm, and setting out of detection parameters (digital-watermarking key information etc.).

[0078] (c) The image between the control signal Cont.3 utility section 113 and the image contents are recording section 110, and interface control of retrieval ID information.

[0079] (d) The change of the output (an image / ID embedding image / retrieval ID information) from the control signal Cont.4 image contents are recording section 110, and the output (ID embedding image / retrieval ID information) from the digital-watermarking detecting element 1110.

[0080] (e) Selection of a control signal Cont.5 image feature-extraction algorithm, and setting out of an extract parameter.

[0081] Such a control condition is set up to each functional module, and, thereby, registration of the image information on the image contents are recording section 110 mentioned above and the output of the image information from the image contents are recording section 110 are performed in the utility section 113.

[0082] Finally, according to drawing 6 , the outline of processing of this invention explained above is explained.

[0083] By this invention, if the image information registered into the image contents are recording section 110 is given, as shown in drawing 6 , as shown in \*\* in drawing, image characteristic quantity will be first extracted from the image for registration in operating two or more extract algorithms using the image feature-extraction section 1130.

[0084] When an image consists of multiple frames at this time, it may process so that what arranged systematically the image characteristic quantity extracted from each frame may be extracted as final image characteristic quantity.

[0085] Then, it embeds on the image for registration using digital watermarking, taking a response with the discernment ID of the extract algorithm which used the extracted image characteristic quantity for the extract of that using the digital-watermarking embedding section 1131, as shown in \*\* in drawing.

[0086] For example, the image characteristic quantity "\*\*\*\*" is extracted by the 1st extract algorithm. When the image characteristic quantity "\*\*\*\*" is extracted by the 2nd extract algorithm and the image characteristic quantity "gammagamma" is

extracted by the 3rd extract algorithm Image characteristic quantity with the DS image characteristic quantity = (ID=1:\*\*\*\*, ID=2:\*\*\*\*, ID=3:gamma) is embedded on the image for registration using digital watermarking.

[0087] In addition, although two or more algorithms are not operated and one regular extract algorithm may be operated by \*\* in drawing, it is not necessary to embed about the discernment ID of an extract algorithm at this time.

[0088] In this digital-watermarking embedding processing, it may process so that it may embed on the image for registration using digital watermarking also about the management information (information which is not what was directly extracted from the contents of an image, such as a keyword and a comment, information on others unrelated to the content of an image, etc.) of the image for registration.

[0089] Moreover, two or more algorithms of digital-watermarking embedding may be prepared, and the optimal thing may be chosen out of it, and using it, it may process so that image characteristic quantity may be embedded on the image for registration.

[0090] Then, as shown in \*\* in drawing, the image (image where retrieval ID information was embedded) where the image characteristic quantity was embedded is registered into the image contents are recording section 110, taking a response with the embedded image characteristic quantity (retrieval ID information).

[0091] Thus, by this invention, the image by which image characteristic quantity was embedded in the form where the identification information of an extract algorithm and a response are taken, on the image for registration, and the image characteristic quantity was embedded on it will be registered into the image contents are recording section 110 in the form where a response with image characteristic quantity is taken.

[0092] On the other hand, in this invention, if the access image where image characteristic quantity was embedded using digital watermarking is given, as shown in drawing 6, as shown in \*\* in drawing, the access image will be inputted first.

[0093] Then, as shown in \*\* in drawing, the image characteristic quantity (retrieval ID information) currently embedded at it is detected from the inputted access image using the digital-watermarking detecting element 1110.

[0094] Then, as shown in \*\* in drawing, a thing similar to the detected image characteristic quantity (retrieval ID information) is searched with accessing the image contents are recording section 110 using the retrieval section 114 out of the image characteristic quantity (retrieval ID information) memorized by the image contents are recording section 110 (what is usually most similar is searched).

[0095] For example, the retrieval ID information detected by the digital-watermarking detecting element 1110 matches the retrieval section 114 with the discernment ID of an extract algorithm (ID=1:\*\*\*\*, ID=2:\*\*\*\*, ID=3:gamma),

It has the data value to say and, on the other hand, the retrieval ID information memorized by the image contents are recording section 110 matches with the discernment ID of an extract algorithm (ID=1:aa, ID=2:bb, ID=3:cc),

In having the data value to say, based on the distance defined by  $\text{distance} = \frac{2 + ((\gamma - \alpha)^2 + (\gamma - \beta)^2)}{2}^{1/2}$ , it performs retrieval processing by measuring the similarity of two retrieval ID information.

[0096] Then, as shown in \*\* in drawing, ID embedding image matched with the searched image characteristic quantity (retrieval ID information) is read and outputted from the image contents are recording section 110.

[0097] Thus, in this invention, from the image contents are recording section 110, the image where image characteristic quantity with image characteristic quantity similar to the image characteristic quantity detected from the access image was embedded will be searched, and it will be outputted.

[0098] Thus, since the approach of the conventional technique of communicating in this invention in the communication link data format to which retrieval ID information (image characteristic quantity) and an image were made linking is not used, also in case it carries out format conversion of the image sent from the image database for construction of an access environment etc. or image edit processing etc. is performed, the inconvenience that retrieval ID information (image characteristic quantity) is destroyed does not happen.

[0099] Although this invention was explained according to the example of a graphic display implementation gestalt, this invention is not limited to this. For example, the image explained in the example of an operation gestalt is not restricted to an animation, and also contains a still picture.

[0100]

[Effect of the Invention] Since the image where image characteristic quantity was embedded will be searched and outputted from an image database while the image where image characteristic quantity was embedded is registered into an image database according to this invention, as explained above, the trouble which the conventional technique which takes the configuration of outputting in the communication link data format to which image characteristic quantity and an image were made linking has can be solved.

[0101] And in this invention, since the non-language retrieval information that the description information on an image is embedded is used, compared with the retrieval based on linguistic code information, such as a keyword, retrieval of a high precision is expectable.

[0102] and SEMAN not only in in extracting the description of an image, a robust feature extraction being performed by combining two or more algorithms, by this invention, since the combination of the remarkable property of an image is used as retrieval ID information but image recognition -- compared with the method which performs a feature extraction, such as performing tick sight description, the processing load by the side of a server can be lessened.

[0103] And in this invention, it has two or more watermark embedding methods with



which algorithms differ, and the algorithm which embedded out of it and was suitable for the image of the target image characteristic quantity or the embedding point is chosen, and since it spaces using it and information is embedded, resistance can be blown quantity.

[0104] And in this invention, since database are recording of the image characteristic quantity is carried out with the gestalt directly embedded on the image, day base management is not only simplified substantially, but it can avoid the failure and loss accompanying the mismatch of the image and retrieval ID information at the time of employment.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the example of 1 operation gestalt of this invention.

[Drawing 2] It is the example of 1 operation gestalt of a database.

[Drawing 3] It is the explanatory view of an image scene.

[Drawing 4] It is the explanatory view of the image description.

[Drawing 5] It is the explanatory view of a control signal which a database control section publishes.

[Drawing 6] It is the explanatory view of this invention.

[Drawing 7] It is the explanatory view of the conventional technique.

[Description of Notations]

1 Retrieval System

2 Terminal Unit

10 The HP Section

11 Database

20 HP Access Section

21 Down Loading Corresponding Point

100 GUI

101 Access Image Are Recording Section

102 Receive Section

103 Image Transmitting Section

110 Image Contents Are Recording Section

111 Input Interface Section

112 Output Interface Section

113 Utility Section